

REMARKS

The Applicants extend their thanks to the Examiner for kindly allowing the telephonic interview on October 3, 2007. The Applicants also express their appreciation to the time that the Examiner spent in discussing with the Representative of the Applicants the reasons why Bachmann fails to show an inner rotor comprising first teeth each comprising a tooth bottom defined by two hypocycloidal curves connected to the tooth bottoms of the two first teeth adjacent said each first tooth, respectively, an engaging portion configured to engage said outer rotor and defined by involute curves, and a tooth top defined by a predetermined curve. Additionally Applicants explained that there was no motivation to combine Bachmann and Edwards to achieve the claimed invention. This Response is prepared based on the substance covered in the Interview. Reconsideration of this application for allowance of all pending claims is hereby respectfully requested in view of the following remarks.

Claims 1-8 are pending in this application. Claims 4 and 6 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in dependent form including all of the limitations of the base claim and any intervening claims.

Objections to the Specification

Applicants have amended page 3 of the specification to remove the reference to the claim numbers. Accordingly, withdrawal of this objection is requested.

35 U.S.C. § 112 Rejections

In the Office Action, the Examiner has rejected claim 1 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject

matter which applicant regards as the invention. The Examiner asserts that the phrase “a tooth top defined by a predetermined curve” renders the claim indefinite because it is unclear what kind of curve is a predetermined curve. Applicants respectfully disagree.

In claim 1, a predetermined curve simply means a curve that has been predefined. Applicants need not identify any one particular curve. The Examiner asserts that Applicants should “clarify/define the value is predetermined.” It is unclear what value the Examiner wishes Applicants to clarify or define. Applicants submit that claim 1 is proper and fully in compliance with 35 U.S.C. § 112, as is. However, if the Examiner wishes to maintain this rejection, Applicants respectfully request clarification as to what is meant by “clarify/define the values is predetermined.”

Claim Rejections Under 35 U.S.C. § 103

Claims 1-3 and 5 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over US Patent 1,516,591 (Edwards) in view of Patent Application Publication 2003-0072665 (Bachmann et al.). Applicants traverse this rejection for at least the following reasons.

Claim 1 recites, among other things, an inner rotor of an internal gear pump comprising first teeth each comprising a tooth bottom defined by two hypocycloidal curves connected to the tooth bottoms of the two first teeth adjacent said each first tooth, respectively, an engaging portion configured to engage said outer rotor and defined by involute curves, and a tooth top defined by a predetermined curve. The Examiner asserts that Edwards discloses every feature of claim 1 except that the engaging portion has an involute curve. The Examiner relies on Bachmann to overcome this deficiency.

In Bachmann, cycloids 25 (see Figure 5) each form a tooth crest 18 of a planetary gear 7. The cycloids are therefore epicycloids. An epicycloid is a curve generated by the

motion of a point on the circumference of a circle that rolls externally, without slipping, on a fixed circle (see, e.g., Webster's Dictionary).

In contrast, the claims of the present invention recite hypocycloids which each form a tooth bottom of the inner rotor. A hypocycloid is a curve generated by the motion of a point on the circumference of a circle that rolls internally, without slipping, on a fixed circle. One of ordinary skill in the art would readily recognize that forming a tooth crest with an epicycloid is quite different from forming a tooth bottom with a hypocycloid.

Furthermore, there is no motivation or suggestion to combine Edwards with Bachmann. Edwards discloses an internal gear pump in which the inner rotor has one less tooth than the outer rotor. In such an arrangement where the number of teeth of the inner rotor is small, it is difficult if not impossible to simply form the engaging portions of the teeth of the inner rotor with involute curves due to involute interferences. Attached as Exhibit A is a copy of a Japanese language article describing involute interference, and its partial English translation.

It is only the inventors of the present invention who have discovered that it is possible to eliminate the influence of such involute interference by forming tooth bottoms with hypocycloids and connecting the hypocycloids to the involute curves forming engaging portions of the teeth of the inner rotor, even if the inner rotor has one less tooth than the outer rotor. Neither Bachmann nor Edwards, alone or in combination with each other, disclose this feature.

Accordingly, as each and every limitation must be disclosed or suggested by the prior art references in order to establish a *prima facie* case of obviousness (MPEP § 2143.03), and none of the cited references, alone or in combination with each other, disclose or even suggest at least

the features recited above, it is respectfully submitted that claim 1 is patentable over the cited references.

Claims 2 – 8 depend from claim 1. Under Federal Circuit guidelines, a dependent claim is nonobvious if the independent claim upon which it depends is allowable because all the limitations of the independent claim are contained in the dependent claims, *Harness International Inc. v. Simplimatic Engineering Co.*, 819 F.2d at 1100, 1108 (Fed. Cir. 1987). Accordingly, the independent claims are patentable for at least the reasons set forth above, it is respectfully submitted that all dependent claims are also in condition for allowance. In addition, it is respectfully submitted that the dependent claims are patentable based on their own merits by adding novel and non-obvious features to the combination.

Based upon the foregoing it should be apparent that the imposed objections and rejections have been overcome and that all pending claims are in condition for immediate allowance. Favorable consideration is, therefore, solicited.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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